

AD-750 948

**SOLDER FOR CONNECTING SEMICONDUCTOR
SYSTEMS WITH A METAL BASE**

Ivan Soska

Foreign Technology Division
Wright-Patterson Air Force Base, Ohio

17 August 1972

DISTRIBUTED BY:

NTIS

**National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151**

AD750948

FTD-HT-23-0285-72

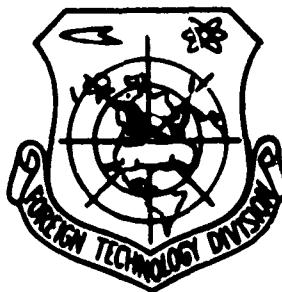
FOREIGN TECHNOLOGY DIVISION



SOLDER FOR CONNECTING SEMICONDUCTOR
SYSTEMS WITH A METAL BASE

by

Ivan Soska



Approved for public release;
distribution unlimited.

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE

U.S. Department of Commerce
Springfield, VA 22151

708

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Foreign Technology Division Air Force Systems Command U. S. Air Force		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	
		2b. GROUP	
3. REPORT TITLE SOLDER FOR CONNECTING SEMICONDUCTOR SYSTEMS WITH A METAL BASE			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Translation			
5. AUTHOR(S) (First name, middle initial, last name) Ivan Soska			
6. REPORT DATE 26 Sept. 1966		7a. TOTAL NO. OF PAGES 7	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) FTD-HT-23-0285-72	
9. PROJECT NO. T71-05-09 T71-05-13		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Foreign Technology Division Wright-Patterson AFB, Ohio	
13. ABSTRACT This invention concerns solder for connecting semiconductor systems with a metal base having a different thermal expansibility, distinguished by the fact that it is composed of 45-90% lead, 1-10% gold and the rest indium.			

UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Solder Thermal Expansion Gold Lead Indium						

UNCLASSIFIED
Security Classification

EDITED TRANSLATION

FTD-HT-23-0285-72

SOLDER FOR CONNECTING SEMICONDUCTOR SYSTEMS
WITH A METAL BASE

By: Ivan Soska

English pages: 3

Source: CZECH Patent No. 134400
(PV 7533-66, Nov. 26, 1966)
1969, 2 pages.

Requester: FTD/PDTA

Translated by: Henry Peck

Approved for public release;
distribution unlimited.

THIS TRANSLATION IS A RE rendition OF THE ORIGINAL FOREIGN TEXT WITHOUT ANY ANALYTICAL OR EDITORIAL COMMENT. STATEMENTS OR THEORIES ADVOCATED OR IMPLIED ARE THOSE OF THE SOURCE AND DO NOT NECESSARILY REFLECT THE POSITION OR OPINION OF THE FOREIGN TECHNOLOGY DIVISION.

PREPARED BY:

TRANSLATION DIVISION
FOREIGN TECHNOLOGY DIVISION
WP-APB, OND.

FTD-HT - 23-0285-72

Date 17 Aug 1972

SOLDER FOR CONNECTING SEMICONDUCTOR SYSTEMS WITH A METAL BASE

Ivan Soska

The invention concerns solder for connecting metal sections of semiconductor parts whose components do not operate in a semiconductor system of undesirable diffusion.

It is required of solders connecting semiconductor systems with the housing base, especially in output semiconductors, that on the one hand the forces appearing from various dilatation of the connected sections be entrapped by their plastic deformation and further that the electrical and thermal resistances of the base-collector junction increase substantially. The types of solder used for this purpose at the present time ordinarily contain either silver, cadmium, tin or zinc as their second component in addition to lead.

However, their use in soldering semiconductors to a base brings in the substantial disadvantage that the solder's components which are already decreased are diffused into the semiconductor during the soldering process, which substantially reduces the electrical properties of the semiconductor part.

This difficulty can be prevented by using the solder from the invention, which, in addition, also counters thermal stress by its own plastic deformation.

The object of the invention is solder for connecting a semiconductor system with a metal base having a different thermal expansibility, which is distinguished by the fact that it is composed of from 45 to 90% lead, 1 to 10% gold, and the rest indium.

According to the invention the solder in its molten state adheres to the soldered surfaces of both the semiconductor and the base, and after it hardens, by plastic deformation it takes on the stress forces arising from the various thermal dilatation of the connected parts. With respect to the low tension of the gold vapors it is possible to use the solder in cases, for example, in which with a cadmium or zinc content it would act unfavorably on the electrical parameters of the system. The solder's melting point in relationship to its components can be selected with the range of 150-325°C.

The practical use of the solder, as will be described in the next example, concerns a case in which the vapors of the solder's metal components may not exert an unfavorable change in the electrical properties of the semiconductor system as a result of the unfavorable condensation of these metals on the semiconductor surface. A solder applicable to this purpose has a melting point of 300°C and is composed of 80% lead, 2% gold, and 18% indium. Sections of the required size are cut out of the foil of this solder, approximately 50 μ m thick and are laid between the base and the semiconductor system. The built-up unit is heated to 309°C and is then left to cool. After cooling, a mechanically stable and dilationally well resistant bounding of the semiconductor with the base is formed

without the semiconductor's electrical and thermal resistances being unfavorably modified by soldering.

OBJECT OF THE PATENT

Solder for connecting semiconductor systems with a metal base having a different thermal expansibility, distinguished by the fact that it is composed of 45-90% lead, 1-10% gold, and the rest indium.